UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII
999 18th STREET - SUITE 500
DENVER, COLORADO 80202-2466

MAY 7 1992

000014985

Ref: 8HWM-FF

Mr. Frazer Lockhart
U.S Department of Energy
Rocky Flats Office
P.O Box 928
Golden, CO 80402-0928

RE: Review of Oxidation/Reduction Processes Treatability Study Plan

Dear Mr. Lockhart,

Overall, this workplan contains the required technical information specified in the Final Site-Wide Treatability Study Plan (TSP). However, this workplan needs to specify the following: 1) regulatory requirements associated with conducting the tests, 2) whether the tests are going to be performed on-site or off-site, and 3) the anticipated start and completion dates. It is our understanding that the objective of these studies is primarily to validate technology and that this validation is intended to generate a "yes" or "no" answer on whether these processes are effective in treating the waste or contaminated media and whether the technology should be considered further. The workplan details and explains the steps which are to be followed when conducting the tests. We feel that these tests will allow the objective to be met. Enclosed, please find our contractor's comments for your consideration.

Please, do not hesitate to contact Arturo Duran of my staff at 294-1080 with any questions you may have.

Sincerely,

Martin Hestmark, Manager
Rocky Flats Project

Attachment
cc: Scott Grace, DOE
Tom Greengard, EG&G
Olga Erlich, EG&G
Gary Baughman, CDH
Noreen Matsuura, CDH

PRC Environmental Management, Inc
1099 18th Street
Suite 1960
Denver CO 80202
303-295-1101
Fax 303-295-2818

April 1, 1992

Mr Arturo Duran
U S Environmental Protection Agency
999 18th Street
Denver, CO 80202

RE Technical Review of Final Draft Treatability Study Work Plan for Oxidation/Reduction Processes, Rocky Flats Plant, Golden, Colorado, Work Assignment Number C08061, Contract Number 68-W9-0009, Technical Enforcement Support 12

Dear Arturo

At the request of the U S Environmental Protection Agency (EPA), PRC Environmental Management, Inc (PRC) reviewed the treatability study work plan dated January 1992 for oxidation/reduction processes for the Rocky Flats Plant (RFP) Enclosed with this letter are the technical review comments Please call me at 295-1101 if you have any questions or comments

Sincerely,

PRC Environmental Management, Inc.

Lynn A Davies
Project Manager

Enclosure

cc Martin Hestmark, EPA
Terry Ruiter, PRC
PRC File

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ROCKY FLATS PLANT
GOLDEN, COLORADO

FINAL DRAFT TREATABILITY STUDY WORK PLAN FOR OXIDATION/REDUCTION PROCESSES

Prepared for

U S ENVIRONMENTAL PROTECTION AGENCY
Region 8 Federal Facilities Remedial Branch
Denver, Colorado

Work Assignment	C08061
EPA Region	8
Site No	C07890010526
Date Prepared	April 1, 1992
Contract No	68-W9-0009
PRC No	012-C08061
Prepared by	PRC Environmental Management, Inc (Lynn Davies)
Telephone No	303/295-1101
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Telephone No	294-1080

RE. 012-C08061\KRISTA\REDOXWP REV\4-2-92\kdg

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1.0 INTRODUCTION

PRC Environmental Management, Inc (PRC) received work assignment number C08061, contract number 68-W9-0009, Technical Enforcement Support (TES) 12, from the U S Environmental Protection Agency (EPA) This work assignment requires PRC to provide technical oversight and document reviews for areawide remedial investigation/feasibility study (RI/FS) activities at Rocky Flats Plant (RFP) in Golden, Colorado

At the request of EPA, PRC reviewed the treatability study work plan dated January 1992 for oxidation/reduction processes for RFP The work plan was evaluated for technical adequacy and compliance with the work plan outline described in Section 6 0 the RFP Final Treatability Studies Plan (TSP) dated June 3, 1991

In general, the oxidation/reduction processes treatability study work plan was technically appropriate and presented the elements listed in the Final TSP However, the organization of the work plan is confusing, and some of the elements described in the Final TSP are not present The following sections present general and specific comments that recommend the clarification of inconsistencies between the Final TSP and the treatability study work plan PRC recommends that these comments should be addressed before the oxidation/reduction treatability study is performed General comments are presented in Section 2 0, and specific comments appear in Section 3 0

2 0 GENERAL COMMENTS

The treatability study work plan for oxidation/reduction processes provides step-by-step instructions for completing experiments on several processes for removing metals and radionuclides from surface and ground water collected from RFP The work plan generally included all of the elements presented in the Final TSP The following general comments refer to inconsistencies that should be addressed

1 The treatability study work plan for oxidation/reduction processes is confusing in its organization The work plan describes elements that should be included, however, the descriptions of these elements are not specific to the oxidation/reduction processes to be

investigated in the treatability studies The following elements should be described in the work plan as they directly relate to oxidation/reduction treatability studies: (1) scope, (2) test objectives, (3) data quality objectives (DQOs), (4) experimental procedures and equipment, (5) data management, (6) analysis of results, (7) regulatory requirements, (8) residuals management, (9) reporting and scheduling, (10) health and safety, and (11) sampling and analysis

2 The oxidation/reduction treatability study work plan describes several processes to be investigated during this study. It is not clear, however, whether the individual processes are considered one test or a set of independent studies that involve similar chemical processes. The text should to modified to clarify this distinction.

3 The Final TSP indicates that each specific treatability study work plan will include a description of test objectives. This section should explain technology validation and performance evaluation Technology validation determines whether the specific technology is effective in treating the waste or contaminated media and should be considered further Performance evaluation measures the efficiency of the treatment, the quality of the effluent, or the residual concentrations in the environmental medium. The oxidation/reduction processes treatability study work plan does not discuss how the performance of each oxidation/reduction process will be evaluated. The work plan should discuss the procedure to be followed to evaluate the various treatability studies

4 According to the Final TSP, the description of treatability test objectives should include a discussion of reproducibility of the treatment over the expected range of site and waste/media characteristics In addition, this section should describe the reproducibility of results. The oxidation/reduction processes treatability study work plan does not include a discussion of reproducibility of the treatment or range of treatment residuals. Reproducibility of the treatment and results is important in the evaluation of the performance and should be discussed in the work plan.

5 According the Final TSP, individual treatability study work plans should discuss the regulatory requirements for on-site or off-site treatability testing The oxidation/reduction

processes treatability study work plan does not address federal, state, or local regulatory requirements that affect treatability testing on- or off-site Personnel conducting treatability studies should be aware of permitting and operating requirements related to the specific test being performed These regulations should be discussed in the oxidation/reduction processes treatability study work plan

3 0 SPECIFIC COMMENTS

The following comments identify technical deficiencies or inconsistencies in specific sections of the oxidation/reduction processes treatability study work plan

1 Section 1.0, Page 1 This section lists four oxidation/reduction processes to be described in the work plan In addition, Section 5 3 lists the first-priority processes for reduction and oxidation, and describes each under a separate task Section 1 0 lists the three reduction processes to be investigated as (1) sodium bisulfite, (2) stannous chloride, and (3) ferrous sulfate The introduction in Section 5 3 lists (1) sulfite, (2) stannous chloride, and (3) ferrous iron The individual task descriptions and the corresponding figures are labelled as (1) sodium bisulfite, (2) stannous chloride, and (3) ferrous salt Consistent terminology should be used when discussing these processes The text should be modified to clarify this inconsistency

Rationale Consistent use of terminology clarifies the document and enhances its utility

2 Section 4.2, Page 3 Section 4 0 describes the three-stage process of establishing the DQOs for the project According to the Final TSP, Stage 2 should stipulate the criteria for determining data adequacy, and select sampling approaches and analytical procedures Section 4 2 does not delineate the criteria for determining data adequacy nor does it specify approaches for sampling and analysis for the oxidation/reduction processes treatability study Although the sampling approaches and procedures are described on page 9 in Section 4 3 (Stage 3), the work plan also should describe the criteria for determining data adequacy for the test to be conducted

Rationale The individual treatability study work plans should include the elements described in the final TSP to provide a consistent and comprehensive description of the processes involved in conducting the studies. The criteria for determining data adequacy are important in evaluating treatment technologies

3 Section 4.2.3, Page 6 Section 4.2.3 and Table 4.1 describe the levels of analytical data quality to be used in treatability studies According the Final TSP, analytical levels I and II should be used when laboratory screening studies are performed. The oxidation/reduction processes treatability study includes only laboratory-scale tests. Table 4-1 indicates that analytical levels III and IV will be used for various parts of the oxidation/reduction study. The inconsistency between the Final TSP and the oxidation/reduction treatability study work plan should be corrected.

In addition, the Final TSP includes a description of confidence limits associated with each level of analytical data quality An explanation of confidence limits should be included in the oxidation/reduction processes treatability study work plan.

Rationale: The description of analytical levels used for laboratory-scale tests should be consistent between the Final TSP and the oxidation/reduction processes treatability study work plan to clarify the levels of analytical data quality required in individual treatability studies.

4 Section 4.2.4, Page 7. This section of the work plan describes the process for evaluating sampling and analysis options. The Final TSP indicates that sampling approaches and analytical procedures will be selected during Stage 2 of the DQO process. However, Section 4 2 4 does not describe the specific sampling approach or analytical procedure to be used during the oxidation/reduction processes treatability study. Sampling and analysis procedures to be used during the oxidation/reduction processes treatability study should be described in the work plan

Rationale: The description of the DQO selection process should be consistent with the Final TSP and should be specific to the oxidation/reduction processes treatability study, to provide a complete description of procedures

5 Section 4.3, Page 9 Section 4 0 describes the DQOs of the project According to the Final TSP, the methods for obtaining data of acceptable quality and quantity to be incorporated in the Quality Assurance Addendum (QAA) of the treatability study work plan should be selected during Stage 3 of the DQO process However, the process for identifying data quality and quantity needs is described in Section 4 2 3 (Stage 2) The oxidation/reduction processes treatability study work plan should be consistent with the outline presented in the Final TSP

Rationale The individual treatability study work plans should include the elements described in the Final TSP to provide a consistent and comprehensive description of the processes involved in conducting the studies

6 Section 5.0, Page 1 This section describes the approach and procedures to be followed in the treatability study According to the Final TSP, the experimental design and procedures section should identify several factors that have not been discussed in the oxidation/reduction processes treatability study work plan These include the sample locations for use in the study and whether the test will be conducted at an on- or off-site facility However, Section 5 0 does not discuss either of these factors

The locations for collection of contaminated samples are provided in the Sampling and Analysis Plan (Appendix A) Section 5 0 should refer to Appendix A, and a site map and one or more cross-sections should be included to illustrate the sampling locations The experimental design and procedures section should also indicate the type of facility needed to conduct the study and whether they are on- or off-site

Rationale To provide comprehensive project information, the oxidation/reduction processes treatability study work plan should describe the sample locations for collection of material used in the study, and the facility necessary to perform the test

7 Section 5.0, Page 1 In addition to the factors listed above, the Final TSP indicates that the individual treatability study work plans will include an explanation of the level of replication required when conducting treatability studies The experimental design and procedures section should describe the type and amount of experimental replication required

Rationale: A certain level of replication in the experimental procedure is required to evaluate the reliability and effectiveness of the process.

8 Section 5.3, Page 7. According to the Final TSP, the experimental design and procedures section should refer to standard operating procedures (SOPs) for measurements such as pH, electrical conductivity (EC), and oxidation/reduction potential (redox). However, Section 5.3 does not refer to SOPs or provide descriptions of procedures for the measurement of these parameters. The detailed task descriptions should describe the measurement of pH, EC, and redox.

Rationale: The detailed descriptions of experimental procedures should include all information necessary to perform the treatability study to present a complete project discussion.

9 Section 5.3, Tasks 2 through 9. Each of the processes described in Section 5.3 involves allowing solids to settle out of solution. However, the precipitates are not listed as being analyzed for the constituents of concern to perform a mass balance for each process. In order to evaluate the effectiveness of the treatability study, all products of the treatability study should be analyzed for contaminants of concern before disposal.

Rationale: Characterization of the wastes produced in a treatability study provides a complete set of data to evaluate the effectiveness of the test.

10 Section 5.3, Task 2, Page 10. Task 2 describes ferrous salt reduction and refers to a flowchart illustrated in Figure 5-4. The first paragraph of the text indicates that 200 milliliter (mL) sample aliquots will be used. The flowchart and Step 1 of the text begin by describing three 4-liter (L) samples. It is unclear when the 200 mL aliquots will be used. The text should be corrected to clarify this inconsistency.

Rationale: The detailed descriptions of experimental procedures should include all steps. Furthermore, the introduction should be consistent with both the step-by-step description with the figures illustrating the process flow to avoid confusion when conducting the test.

11 Section 5.3, Task 3, Page 13 As described in Comment 10, the introduction to Task 3 (sodium bisulfite reduction) discusses 200 mL aliquots of sample, while Step 1 and Figure 5-5 indicate that 4 L of sample are used in the initial step of the test The text should be corrected to clarify this inconsistency

Rationale The detailed descriptions of experimental procedures should include all steps Furthermore, the introduction should be consistent with both the step-by-step description and with the figures illustrating the process flow to avoid confusion when conducting the test

12 Section 5.3, Task 6, Step 2, Page 20 This step discusses the selection of "the most effective anionic polymer " None of the steps describes how the effectiveness of these polymers will be evaluated The procedures should be modified to describe the evaluation of polymer effectiveness

Rationale The detailed descriptions of experimental procedures should include all information necessary to perform the treatability study

13 Section 5.3, Task 10, Page 31 This section describes laboratory restoration The procedures listed are general, and do not provide sufficient detail to ensure adequate decontamination of equipment and proper disposal of wastes This section should provide step-by-step instructions for cleaning glassware and equipment, including the solvents or reagents necessary to perform the decontamination, and clearly describe the methods for collecting waste solvents In addition, the work plan should describe the disposal of waste reagents generated during decontamination The text should be amended to include more detailed descriptions of procedures or references to existing procedures, and appropriate disposal should be discussed in the management of residuals section (Section 9 0)

Rationale The treatability study work plan should include detailed descriptions of the handling of samples, reagents, and effluents from collection through disposal

14 Section 8.0, Page 1. According the Final TSP, the analysis of results section of the treatability study work plan should describe how the data will be summarized and evaluated The work plan does not describe how the data generated in the treatability study will be evaluated to determine the effectiveness of the process in removing contaminants of concern. The text should be amended to include a discussion on data evaluation and interpretation.

Rationale. Description of data evaluation should be included in the treatability study work plan to provide a comprehensive procedure for conducting all aspects of the test.

15 Section 8.0, Page 1. This section describes the analysis and interpretation of data collected during the treatability studies. Section 8 0 references Section 6.7 of the Final TSP, which is a general document and does not contain the necessary information. Therefore, Section 8 0 of the treatability study work plan should include details specific to the evaluation of the oxidation/reduction processes treatability studies to be performed at RFP.

Rationale. The analysis of results should be specific to the treatability study being conducted.

16 Section 8.0, Page 1 According to this section, Appendix C presents a draft of the RFP Quality Assurance Project Plan (QAPjP) Appendix C is a Quality Assurance Addendum (QAA) to the QAPjP The text should be corrected to refer to the appropriate document

Rationale: References to sitewide documents and appendices should be accurate to enhance the utility of the document

17 Section 9.0, Page 1 This section describes the management of wastes generated during treatability testing According to the Final TSP, this section should discuss the disposal of used, expendable containers and contaminated protective clothing, neither of which is described in the treatability study work plan. In addition, the residuals management section should explain how wastes and residuals will be analyzed to determine whether they are hazardous wastes or contain hazardous substances. The text should be amended to address these subjects

Rationale To dispose of treatability study wastes and residuals appropriately, the products of the test should be characterized before disposal and all contaminated equipment and containers should be identified

18 Section 9.0, Page 1, Paragraph 1 This paragraph describes the storage of liquid and solid wastes generated during treatability testing According to the second sentence, "solid residues will be sorted in 1-gallon resealable DOT [Department of Transportation] metal containers " The last sentence of the paragraph indicates that "solid waste will fill three 55-gallon drums " These statements are conflicting The test should be corrected to indicate the appropriate containers for solid waste storage

Rationale Consistent descriptions of solid waste storage containers presented in the text of the treatability study work plan will prevent confusion and enhance the utility of the document

19 Appendix B Appendix B presents a sample health and safety plan According to the Final TSP, individual treatability study work plans should include a project specific health and safety plan The health and safety plan included is an example, and not specific to the oxidation/reduction treatability studies The plan should discuss the hazards associated with the specific treatability tests to be conducted

Rationale A project health and safety plan should address the specific hazards associated with the project at hand It may reference a sitewide health and safety plan, but may also amend the sitewide plan for the specific activities to be conducted

4 0 CONCLUSION

In general, the treatability study work plan is technically appropriate It needs clarification if it is to be used as a guide for conducting oxidation/reduction the treatability study if it were reorganized to specifically address each element described in the Final TSP in a comprehensive manner General descriptions of what should be included should be left to the Final TSP, and

relevant descriptions should be written to provide sufficient detail to direct the specific oxidation/reduction processes treatability studies to be conducted.